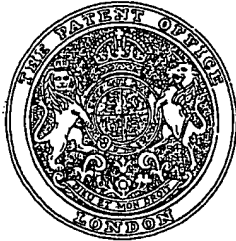


PATENT SPECIFICATION



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COMPLETE SPECIFICATION

Improvements in Machines for Pressing Grooves or Vents in Sheet Material

We, AKTIEBOLAGET SVETSMEKANO, of Marieholmsgatan 10, Goteborg, Sweden, a Swedish Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed particularly described in and by the following statement:—

This invention relates to a pressing machine, which is particularly intended to be used for pressing vents, or so-called gill openings, in sheet-metal or in plastic materials. Such ventilation openings are produced by first cutting a straight incision in the material and by then working one edge portion along the incision by pressing, the edge portion thus pressed out then showing a straight intermediate portion of an arcuate cross section and rounded end portions forming off-sets against the plane portion of the material at the ends of the incision. Hitherto this pressing operation would generally be performed by working the entire edge portion along the incision in a single operation by pressing the plate between a punch and a die having a press form corresponding to the desired shape of the gill opening. In such work, however, the strongly bent edge portions are subjected to heavy strains that may cause breakage of the material at the ends of the incision.

The present invention has for its object to provide means for forming the grooves or vents by a gentle intermittent pressing operation. To this end the sheet-metal or plastic material is operated upon by means of a reciprocating punch and a die having impact surfaces of a configuration corresponding to the intermediate portion and the end portions of the groove, the die being adjustable laterally relatively to the path of movement of the punch in such a manner that each of the end impact surfaces may be brought into operative position opposite to the corresponding end surface of the punch. According to one embodiment the end impact surfaces are arranged one on each side of an

intermediate impact surface, the die being swingably mounted and adjustable into three corresponding positions for moulding the intermediate portion and each of the end portions of the groove separately. By so arranging the pressing tools it is possible to make grooves or vent openings of any desired length without changing the tools. Preferably the punch is made in the form of a combined pressing and cutting tool so as to permit it being used both for cutting the incisions and for forming the edge portion of the incision. The invention is not restricted, however, to a combined shearing and pressing operation but may be used in a general way for the forming of grooves or channel-like swells in plates.

The invention will now be described with reference to the accompanying drawings, which illustrate different embodiments of a tool set for use in a pressing machine according to the invention.

Fig. 1 is a perspective view of a plate with a gill opening of the ordinary configuration therein.

Fig. 2 shows a combined cutting and pressing tool set consisting of a punch and a die, said tools being represented in vertical projection and in vertical section.

Fig. 3 is an end view of the tools shown in Fig. 2.

Fig. 4 is a plan view of the die.

Figs. 5 and 6 show a tool set according to a second embodiment in vertical projection and in vertical section, respectively.

Figs. 7 and 8 show a third embodiment in elevation and in a plan view, respectively.

Fig. 9 shows a fourth embodiment of the tools.

Fig. 10 shows the adjustable part of the die for the last-mentioned tool in a perspective view.

As shown in Fig. 1, the punched edge portion of the gill opening has a straight intermediate part 1 of a substantially cylindrical

configuration and two rounded end portions 2, 3 set off against the plane surface of the plate at the ends of the gill opening.

In the embodiments shown in Figs. 2, 3 and 4, the tool set comprises a punch 4 and a die 5. The punch 4 is secured by means of a square stud 6 in a vertically movable tool holder 7 in the upper part of the machine frame 8. The punch is provided with a flange 9 located above the same, said flange having a plane lower side which is adapted to bear on the plate to be operated upon as the punch is caused to execute a vertical reciprocating movement. The punch is limited on the rear side thereof by a surface of revolution 10, such as a frustum of a spherical surface, with an axis parallel to the direction of movement of the punch. The punch is limited on the front side thereof by a plane surface 11 parallel to the direction of movement of the punch. The line of intersection between the two surfaces 10, 11 forms a circular edge 12, by means of which the punch may be used also as a cutting tool for cutting incisions in the plate material. The edge 12 co-operates with an edge 13 on a cross piece 14 connected through a plate 15 to a square stud 16 mounted in the lower part of the machine frame. The plate 15 serves as a base for the die 5, which is swingably mounted on the plate 15 by means of a vertical pin 17. The die may thus be adjusted into different angular positions relatively to the punch by being turned about said pin. In the example shown, the die is intended to be adjusted into and locked in three different angular positions, for which purpose the die is provided with a handle 18, which is swingably connected to the rear part 19 of the die by means of a horizontal pin 20. Provided at the rear edge of the plate 15 are three channel-like recesses 21, 22 and 23 extending radially from the pin 17. The inner end 24 of the handle 18 can be lowered into said recesses to arrest the die in three corresponding positions.

As will be seen from Figs. 2 and 4, the front edge portion of the die is formed in correspondence to the shape of the edge portion of the gill opening. It thus presents an intermediate portion 25 of an outline corresponding to the straight part 1 of the edge portion of the gill opening, and two portions 26, 27 formed in correspondence to the end portions 2 and 3, Fig. 1. The impact surface of the die is formed by a recess in the outer edge portion of the die, said recess having the form of a circular arc with its centre in the swinging axis of the die.

The production of a gill opening proceeds as follows. The plate is introduced between the punch and the die so that it will rest on the die and the cross piece 14. The plate is then advanced in a horizontal direction underneath the punch from one end of the

required gill opening to the other a straight incision being thus cut in the plate. During this procedure the die is in the central position shown in the drawing with the handle 18 in its intermediate position. After that the die 5 and the plate 15 are raised with the aid of a screw mechanism co-operating with the stud 16, but not shown in the drawing, on to a level suitable for the pressing operation, the punch 4 then lying approximately 75 on the middle of the gill opening. The pressing operation is then performed by displacing the plate, first in one direction and then in the opposite direction, along the edge 13. When the end portions of the gill opening 80 reach the punch the die 5 is turned by means of the handle, so that the corresponding end portions of the die, 26 and 27 respectively, will be brought into operative position for the pressing of the end portions 2, 3 of the gill 85 opening.

Instead of raising the die on to a level suited for the pressing operation, the tool holder 7 may, on the shearing operation having been effected, be adjusted to a greater 90 length of stroke adapted to the pressing operation, whereupon the latter may be effected in the manner above described.

For the cutting and punching of the next gill opening the plate is displaced toward 95 the left in Fig. 2, a curved end surface 28 of the cross piece 14 then serving as a support for the pressed-out portion of the plate to secure a predetermined distance between the gill openings. 100

The embodiment shown in Figs. 5 and 6 differs from that above described only in that the die 5 is swingable about a horizontal axis by means of a pin 29 secured in the die and mounted in a vertical plate 30, which is in turn secured by means of bolts 31 in an extension of the stud 16. The pin 29 is provided with a head 32, in which the handle 33 is swingably mounted in such manner that the upper end 34 thereof may at the same time serve as a locking member to lock 110 the die in three different positions of adjustment in a manner similar to the indicated in Figs. 2-4. The end 34 of the handle is kept in locking engagement by means of a 115 spring 35. The operative part of the die is formed in a similar manner as in Figs. 2-4 with an intermediate part 25 and two end parts 26, 27, which owing to the configuration of the punch 4 as a body of revolution, 120 which is symmetrically arranged relatively to the vertical plane extending through the pin 29, may co-operate with said parts of the die to shape the edge portions of the gill opening. 125

In the embodiment shown in Figs. 7 and 8, the die consists of a disc 36, which is pivotally mounted on a shifting arm 38 by means of a pin 37, said arm 38 being in turn swingably mounted about a pin 39, which is 130

secured in a die holder 40. The operative part of the die has the shape of a body of revolution with a generatrix corresponding to the outline of the punch 4. The die may be adjusted into different angular positions by being swung about the pin 39. In shaping the straight part of the edge portion of the plate the die takes the position shown by full lines in the drawing. In working the end portions the die is shifted through 90° in one or the other direction, as indicated by a chain-dotted circle 41 in Fig. 8. Obviously, the plate will then only be supported along a generatrix on the disc 36 but by turning the handle 38 in different angular positions the end portions may be properly moulded.

In the embodiment shown in Figs. 9 and 10, the punch 42 is of an elongated shape with a straight and cylindrical intermediate portion and with rounded end portions corresponding to the configuration of the edge portion of the gill opening. However, the punch 42 is of a smaller length than the gill opening. In this embodiment, the operative part of the die consists of a member 44 rigidly arranged on the holder 43 and provided with a straight recess 45 with a cylindrical bottom surface corresponding to the straight part of the plate edge, and of a movable or shiftable member 46 in the form of a yoke with two shanks 47, 48. The shank 47 is provided with two recesses 49 located on opposite sides and corresponding in shape to the end portions of the pressed-out part of the plate. The other shank 48 is provided with two recesses 50 located on opposite sides and having a cylindrical bottom surface corresponding to the outline of the straight part of the plate edge. The member 46 is provided with a stud 51 centrally arranged in the intermediate member of the yoke and permitting of being used as a handle. The member 46 is adapted to be arranged on the holder 43 so that the shanks 47, 48 are caused to grip about the rigid member 44, while the recesses 45, 49 and 50 are aligned with one another. In this position, the yoke may be arrested by means of a pin or a snap lock inserted through apertures 52, 53.

In the cutting of the incision in the plate the yoke 46 is removed from its place on the holder 43. After that the intermediate part of the edge portion of the gill opening is formed over the rigid member 44 of the die. Finally, the member 46 is inserted in its place, whereupon the one end portion of the pressed-out edge of the plate is moulded against the recess 49. The other end portion is moulded in a similar manner, after the member 46 has been loosened and turned through 180°, so that the shank 47 is brought to the opposite side of the intermediate part 44.

What we claim is:—

1. A machine for pressing grooves or vents or similar elongated swells with rounded end portions in sheet-metal or plastic material comprising a punch and a die both having profile configurations corresponding to the 70 cross-sectional and end profiles of the groove, characterised in that the die is adjustable laterally relatively to the path of movement of the punch in such a manner that the portions of the die corresponding to the end 75 portions of the groove can be brought into operative position opposite to the portions of the punch.

2. A machine according to Claim 1, characterised by the fact that the die being 80 swingable and adjustable into three corresponding positions in such a manner that the end portions may be brought into operative position by swinging the die in opposite directions from an intermediate position in 85 which only the intermediate portion of the die is operative, whereas the end portions are in inoperative positions outside the path of movement of the plate to be worked.

3. A machine according to Claim 2, 90 characterised in that the impact surface of the die has the form of a circular arc with its centre in the swinging axis of the die.

4. A machine according to Claim 3, characterised in that the intermediate and 95 end portions of the impact surface of the die are formed by a circular recess in the outer edge portion of the die.

5. A machine according to Claim 2, 3 or 4, characterised in that the die is swingable 100 about an axis parallel to the direction of movement of the punch and located laterally of the path of movement thereof.

6. A machine according to Claim 2, 3 or 4, characterised in that the die is swingable 105 about an axis extending at right angles to the direction of movement of the punch and located underneath the operative part of the die.

7. A machine according to Claim 7, 110 characterised in that the operative surface portion of the punch constitutes part of a surface of revolution, the axis of which is parallel to the direction of movement of the punch. 115

8. A machine according to Claim 7, characterised in that the die is swingably mounted on a pin parallel to the direction of movement of the punch and located in the extension of the path of movement thereof, 120 the operative part of the die having the configuration of a surface of revolution with a generatrix conforming to the sectional curvature of the punch.

9. A machine according to Claim 8, 125 characterised in that the die consists of a disc arranged on a lever in the form of a handle swingable about said pin.

10. A machine according to any of the preceding claims, characterised in that the 130

punch is provided with a cutting edge constituting the line of intersection between a plane surface and a curved surface corresponding to the curvature of the groove, said curved surface being adapted to co-operate with a cutting edge on a stationary part of the holder carrying the die, for the purpose of slitting an incision in the plate along the longitudinal edge of the groove.

10 11. A machine according to Claim 2, characterised in that the die is provided with a handle which is pivotally connected to the die and adapted to co-operate with recesses in a holder carrying the die, for the locking of the latter in its various angular positions.

12. A machine according to any of the preceding claims, characterised in that a stationary part of the holder carrying the die is provided with an abutment so arranged that the finished groove can be set against the same to determine the distance to an adjacent groove in the pressing of a plurality of grooves at the same mutual distances.

13. A machine according to Claim 1, characterised in that the die comprises a stationary intermediate part for moulding the

intermediate portion of the groove and an adjustable part for moulding the end portions thereof.

14. A machine according to Claim 13 characterised in that the adjustable part has the configuration of a yoke, the shanks of which are adapted to embrace the stationary part, one of the shanks being provided with two recesses corresponding to said two end portions and said recesses being so arranged that, after one end portion has been moulded against one of the recesses, the other end portion can be brought into a position on the opposite side of the stationary part of the die by turning the yoke through 180° for the purpose of moulding the other end portion.

15. A machine for pressing openings or grooves or similar elongated swells in sheet-metal or plastic material having its parts constructed and arranged substantially as hereinbefore described with reference to the accompanying drawings.

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Fig. 1.

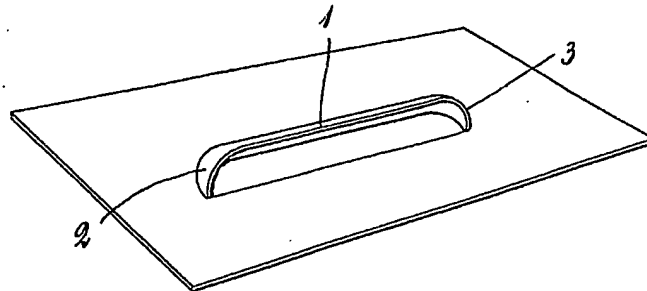


Fig. 2.

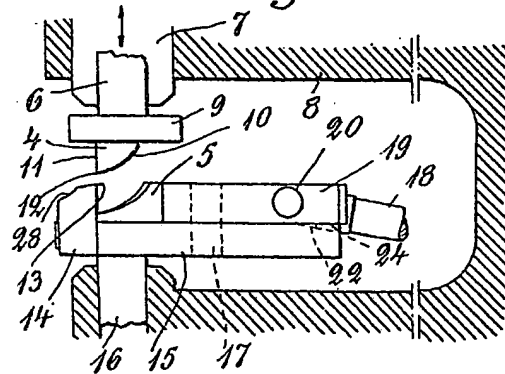


Fig. 3.

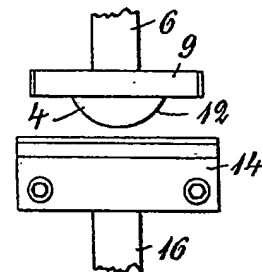
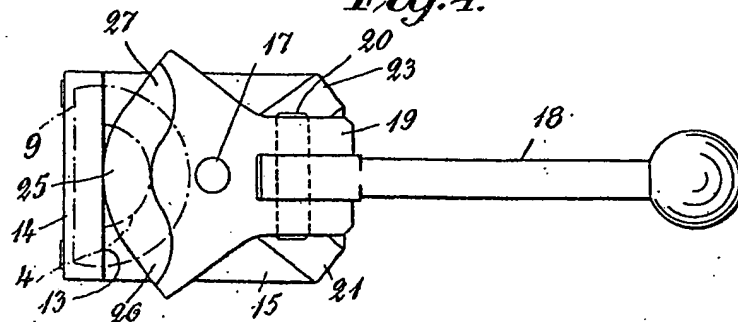


Fig. 4.



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3 SHEETS

This drawing is a reproduction of
the Original on a reduced scale..

SHEETS 1 & 2

Fig. 5.

Fig. 6.

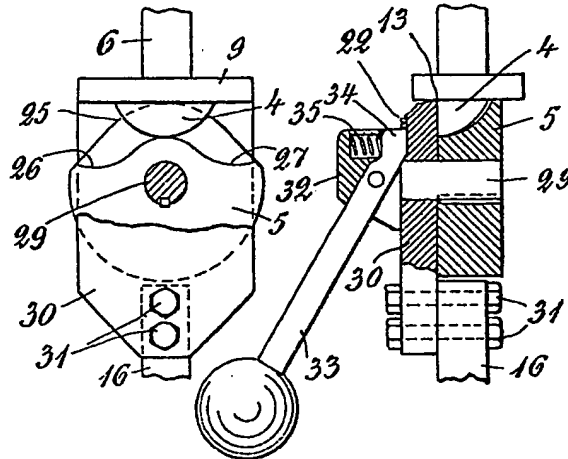


Fig. 7.

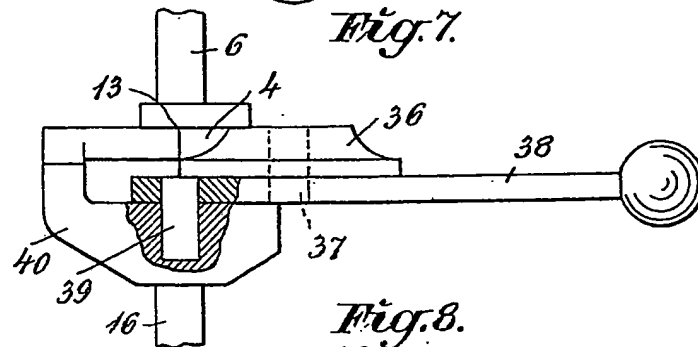
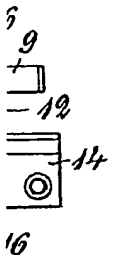
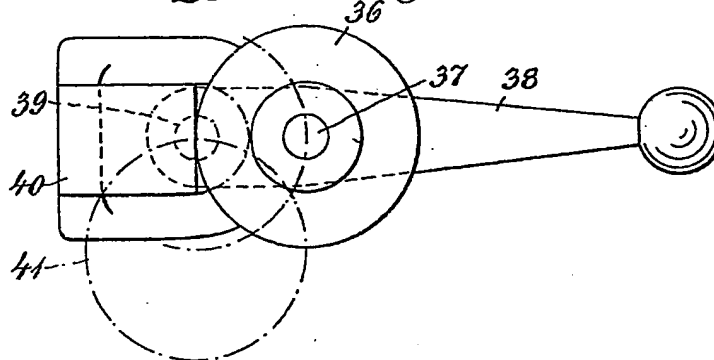


Fig. 8.



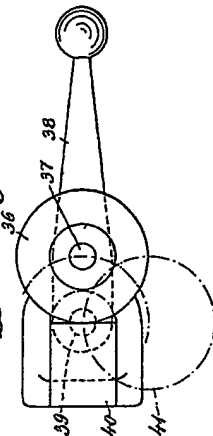
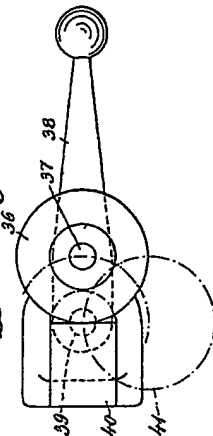
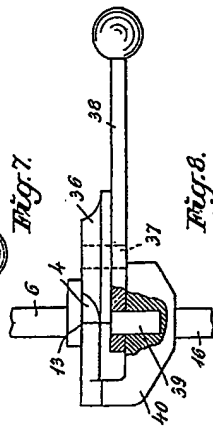
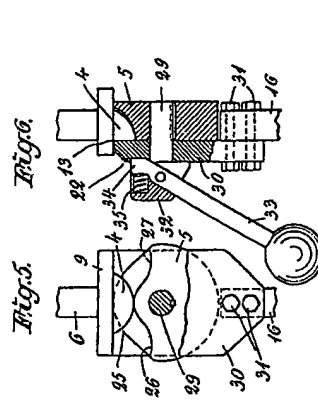
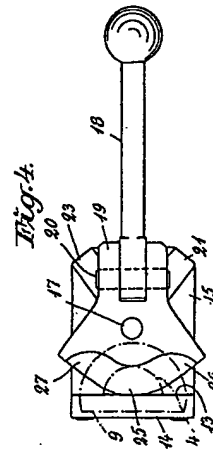
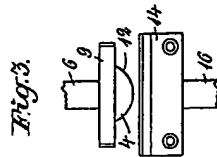
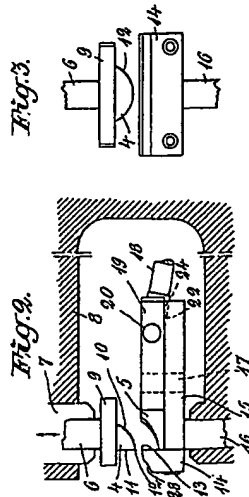
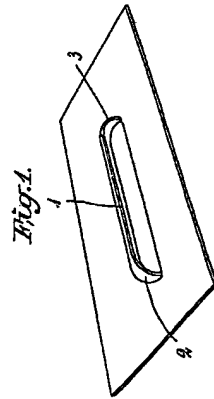


Fig.9.

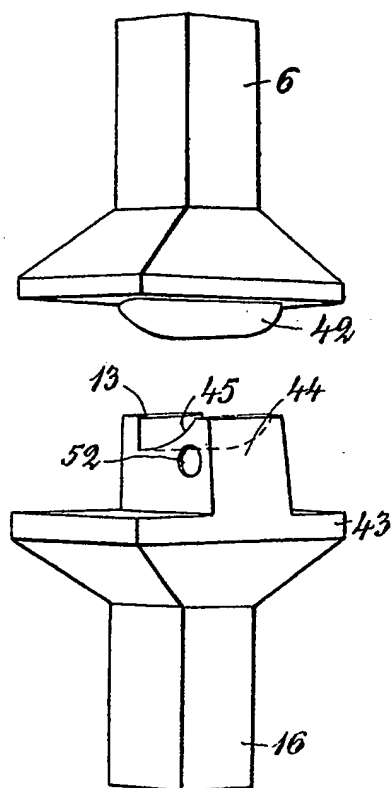


Fig.10.

